(19$ 47) Department.

Ms. SERIES.

G.O. No.

Dated 29th November 1947.

[Despatch Abstract.]

INDUSTRIES - Plywood industry - Papers - Recorded.

GOVERNMENT OF MADRAS
Public (P & D.) Department

Letter No.1558-P&D/47-5

From

The Joint Secretary to Government
Public (P & D) Department

To

The Secretary to the Government of India,
Department of Industries and Supplies,
NEW DELHI

Dated Fort St. George the 2nd April 1947.

Sir,

I am directed to state that the Government of Madras understand that Mr. J. Banerji, I.F.S., I.A.O.C. has submitted to the Government of India, Department of Industries and Supplies an All India Report on the development of Plywood Industry and to request that a copy of the report may, if there be no objection, be sent to this Government.

Your Obedient Servant,

Sd/ ** **
Joint Secretary to Gov

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p.t.o.

Government of India
Ministry of Industry and Supply
No.IP/I(2)-35(7)/47
New Delhi, the 5th November, 1947.

To

The Secretary to the Government of Madras,
Public (P & D) Department,
Fort St. George, Madras

Sub: Report on the development of Plywood Industry in India.

Si.,

I am directed to refer to the correspondence resting with this Ministry's letter No.IP-35(7)/47, dated the 19th June, 1947 on the above subject to forward a copy of the Report by Mr. Glikasten. As the Provincial Government have already been informed Mr. Banerjee has not prepared any All India Report on Plywood Industry.

I am, etc.

C.R. Natesan,
Assistant Secretary to the Government of India.

A PRELIMINARY SHRVEY OF THE DEVELOPMENT OF PLYWOOD MANUFACTURE IN INDIA.

Made at the request of the Government of India (Industries and Civil Supplies Department.)

BY STANLEY G. GLIKSTEN, HANOVER HOUSE
HANOVER SQUARE, LONDON, W.1.

PLYWOOD MANUFACTURE IN INDIA

At the invitation of the Government of Industries and Civil Supplies Department, I recently visited a number of plywood factories with a view to reporting on the future development of the industry and to making recommendations as to the action required to up-grade the manufacture of plywood in India.

There is no doubt that within certain limitations a sound home industry can meet all the plywood requirements, not only for tea-chests (five and a half million tea-chests are being used annually in India atpresent) and similar commercial types, but also for the higher grades required for post-war reconstruction, such as housing, furniture, road, rail and water transportation, including country craft. In this latter connection it should be considered whether the present primitive methods for manufacturing these country boats should be brought up to date and improved by the use of the right type of plywood. Thousands of these boats are in use, particularly along the Bengal River, and there is great scope in their construction and in the expansion which will take place in the ship-building, the motor-car and the building industries, the expansion which will take place in the ship-building, the motor-car and the building industries, as well as in the assembly of railway coaches, freight cars and aeroplanes.

Provided the plywood factories are correctly located, adequate and suitable timber supplies appear to be available, which undoubtedly include species suitable for export as fine veneers for decorative work.

When in India, I had the benefit of discussions with the following gentlemen:-

Hon. Malik Sir Firoz Khan Noon, K.C.S.I., K.C.I.E., Defence Member.
Hon. Dewan Bahadur Sir A. Ramaswami Mudaliar, K.C.S.I. Supply Member
Hon. Sir Ardeshir Dalal, Planning and Development Member
Gen. Sir Thomas Hutton, K.C.I.E., C.B.,M.C., Secretary, Planning and Development Department
H.M. Patel, I.C.S., Secretary, Industries and Civil Supplies Department
T.C. Boyd, Under-Secretary, Industries and Civil Supplies Department
S.A. Venkataraman, C.I.E., I.C.S., Joint Secretary, Department of Supply (Main Secretariat)
Robert Targett, C.I.E., Director-General, Supply; Department of Supply (Directorate General of Supply)
M. Macfarquhar, C.I.E., I.C.S., Deputy Director-General (1) Department of Supply (Directorate General of Supply)
D. Stewart, C.I.E., O.B.E., I.F.S., Deputy Director-General (S), Department of Supply (Directorate General of Supply)
S.C. Aggarwal, Deputy Secretary, Directorate General of Supply, Department of Supply
S. J. Banerji, I.F.S., Director, Woodware Directorate, Department of Supply

Mr. G.B. Deshpande, Assistant Director, Woodware Directorate, Department of Supply.

On my return to England I had the pleasure of meeting Mr. S. Bhoothalingam, I.C.S., Deputy Secretary, Supply Department.

In addition to the above, I saw large number of industriali ~~industries~~ engaged in plywood manufacture in India.

The enthusiastic welcome and assistance received in the plants visited should be recorded. Considerable interest was shown to suggestions for improving the production, in most cases involving expenditure on new plant and extensions to buildings, which the manufacturers expressed willingness to finance themselves, without outside assistance, Special mention should be made of the keenness shown by the managing director of Plywood Products, Sitapore.

Whilst in Bangalore, the Chief Conservator of Forests, Mr. Jabbar, and the Director of Industries, Mr. Appadori Mudaliar, met me. They appeared anxious to put down a complete new plywood factory nearer the forests, in Mysore State, and in my opinion this is the correct thing to do.

Another factory deserving of special mention is that owned by Western India Plywoods Ltd., Baliapatam and I was very much impressed with the keenness and enthusiasm of their managing director, Mr. A.K. Kader Kutty.

All the industrialists and the workers in the Indian Plywood industry were keenly interested in, and asked me many questions regarding, the most up-to-date methods employed in the manufacture of plywood. The plywood industry undoubtedly has some extremely intelligent and enthusiastic men, and I was much impressed by the general desire to improve the quality ~~of~~ and efficiency of production. I was very pleased to answer all the questions put to me; also the management of the factories visited expressed their intentions of corresponding with me in England. I will be only too glad to answer their questions and to help in any particular difficulties which they may encounter. Having acquired most of their knowledge from text-books and trade journals, and never having visited a modern plywood factory, it is most creditable that the plywood industrialists and workers have built up the industry to what it is, forming as it does the nucleus of a large and important Indian industry. If any of these plywood manufacturers should ever visit the United Kingdom, I would be only too pleased to arrange for them to visit the sawmill and plywood operations in which ~~I~~ I am interested.

Whilst I was told that no particular difficulty is being experienced in providing factory labour, the general problem is one of lack of technical supervision, and means must be found for obtaining or training the necessary personnel. In this connection I would make a strong recommendation that at the earliest possible date a mission should visit this country under Govt. auspices, consisting of Government officials from the Plywood Department and Forest Research Institute, Dehra Dun. The mission should also include visits to some of the United Kingdom plywood factories and Government Research stations. It should also include discussions with prominent members of the British Plywood and plastic industries. This can, I understand be arranged through Sir David Meek, of India House, and during the mission's stay in this country I would be glad to assist in the preparation of their itinerary and help in every other possible way. I know that certain plywood interests here would willingly co-operate.

I have already referred to the possibility of India being able to provide all types of plywood to meet future needs. There is, however, an important aspect to be considered.

Although plywood has been known for more than forty years, its wide use for a multitude of constructional purposes has become possible only since the advent of new resin glues and carefully controlled manufacture and some of the most ~~of~~ ~~ne~~ important technical advances have taken place within the last six years. During this period plywood has been made to take strains and stresses ~~wi~~ which it had not previously been thought possible. Plywood has stood the test of the severest conditions, and when bonded with synthetic resin glues is as durable as the timber from which it is made. It will be seen that it is not possible to say whether there are any limits to the development of the Indian plywood industry without an intimate knowledge of the characteristics of many of the available timber species. A considerable amount of investigation into the suitability of species for the manufacture of plywood appears to have been carried out already by the Forest Research institute, Dehra Dun, and a summary of results has been published by the journal of Scientific and industrial Research, but I can find no reference to strength properties of various Indian timbers when made into plywood. If this information is not available, a complete programme of tests should be put in hand immediately.

First of all, the most likely species of timber for the manufacture of high-grade plywood should be selected, and trial cutting undertaken in all thicknesses from ~~0.1~~ 0.011 inch upwards. Such a range would cover not only the extreme thin veneers necessary for aeroplane plywood, but also the heavier thickness for more general uses. Plywood to be tested should be assembled with synthetic resin adhesives, and the tests would need to include glue strength; resistance to mould growth; tensile, compression, impact and sheer strength moduli of elasticity and rupture.

In order to obtain representative results, several hundred specimens would have to be prepared for each mechanical test, and it is essential that veneers used for ~~a~~ such a programme be drawn from a number of logs of each species in order that the wide variations of characteristics which exist in any timber may be adequately covered. When the results of these are obtained, the various species can be catalogued into their respective uses, and the value of the plywood assessed as a medium for stressed structures.

The forest wealth of the world has sustained a heavy drain during the war, and as plywood is the most economical way of using timber, it is the utmost importance that good quality plywood is produced. With improved methods there should be a saving in raw material and labour, resulting in lower costs and greatly improved quality.

If the Indian plywood of the future is to have the wide use which it would deserve, it is vital that the quality be controlled. It has been shown from past experience that this is best accomplished by a series of suitable specifications issued by an authoritative body. Such specifications must, of course, be drawn in practical terms, and such as will not impede production or make it any more expensive. For example, tea-chest plywood is purchased direct by the tea-trade from the plywood factories. The plywood now used is of a relatively low grade; there are nevertheless some standards to which it should comply, and these standsrds could be covered by a simple specification to which all factories making tea-chest plywood would agree to work. In normal time and under ordinary circumstances, one is hesitant about

suggesting such an important step as Government intervention in industrial methods, but in view of the great importance of the tea industry and of the desirability of transportingthe tea in a proper condition, a certain amount of Government guidance may be acceptable. It is not for me to say or to recommend to what extent such methods of control might be carried, but from the purely technical angle I would suggest that the Government should issue an approval certificate ~~of~~ to factories having the necessary plant and technical knowledge for the manufacture of plywood to the agreed specifications. With the higher grades of plywood it is even more important to control quality by means of standard specifications embodying prescribed tests relative to the purpose for which the plywood is to be used.

In the five factories I visited, new machinery and extensions to buildings are required, a matter which is dealt with in some detail in the following pages of this report. The improvements suggested would, without doubt, increase the quality of the tea-chest plywood which is at present being made.

The faults I observe I include severe buckling, irregular gauge and poor adhesion. Unless these faults are corrected, the plywood factories will continue to receive serious complaints from the tea industry. I understand that large quantities of tea have been wasted in the past because tea-chests, made with defective plywood, have burst in transit or in the docks, not only after arrival in the United Kingdom, but even in India before being shipped. Damage has also occurred due to the damp condition of the plywood, which has caused a mould growth and tainted the tea. Plywood tea-chests are relatively low-priced, as they are only a means of transport, but we should not lose sight of the fact that the contents may be twenty or thirty times the value of the case. Furthermore, until the production of tea-chest plywood is put on a proper basis, it is quite out of the question to consider embarking on the manufacture of the ~~x~~ higher grades.

The buckling is probably caused by lack of attention to the moisture content of the veneers before pressing. There were no moisture meters is use, the provision of which would ensure, by constant checking of the veneers, a standard moisture content.

I would also recommend that every factory should have on hand a supply of American "Ames" dial type micrometer gauges for the purpose of checking veneer thicknesses from the ~~xxx~~ cutting stage onwards.

The faulty adhesion can be caused by incorrect and irregular moisture content and by uneven thickness in veneers. There are many other factors which contribute to bad adhesion, all of which will need careful and detailed study in each factory where it exists.

I would illustrate the need for attention to detail by mentioning some samples which I brought away with me from one of the factories. These samples appeared to be of good quality, but on subsequent tests in the United Kingdom it was found that the thickness varied as much ~~xx~~ as 20 per cent in a matter of two to three inches, and, furthermore, the adhesion left much to be desired. These faults are due more to want of equipment and trained personnel rather than to lack of enthusiasm or willingness.

The problems under review can be divided into the following four main headings:--

Timber and Glue supplies
Location of factory
Type of building
Machinery and Equipment.

The factories appear to be handling suitable species, but not in all cases the proper grades. This implies a more careful selection before the logs are sent to the plywood factory, and it is recommended that a sawmill be set up, if not already existing, in all these districts, to consume grades below the standard required for veneer cutting. It would be advantageous if the sawmill were adjacent to the plywood factory, in view of the mixed nature of the forests, so that the different grades can be delivered either to the plywood factory or the sawmill, as the case may be.

The need for the ~~importance~~ timber economy is of great importance, and this problem would be largely solved by the installation of modern machines.

The species available in any district would govern the type of plant and in particular the number of each type of machine. It is obviously of little use attempting to make constructional plywood from week timbers, and in this case certain specialised items of equipment would be omitted.

For high-grade plywood, timber must be well-grown, straight, and the logs should be cylindrical. There must be a ~~good~~ general absence of knots, flutes, decay, insect attack and checks. It must also comply with the required strength standards. For the tea-chest plywood and general commercial grades these points are not so important, but it is desirable that the logs should be cylindrical and of a minimum diameter of thirty inches to thirty-six inches to save time and waste.

Of equal importance to timber is the adhesive. Most Indian factories are now using casein, which has proved in the past to be quite satisfactory for tea-chests, but casein is not suitable for use where the plywood is subjected to prolonged exposure to weather, as in course of time and under certain conditions, the casein develops a fungus growth which destroys the efficiency of plywood. It is understood that the production of casein may be a bottle-neck on account of the short supply of milk. The alternative is a vegetable glue, such as soya bean flour.

Synthetic resin adhesives, either of the phenol or urea type, for high-grade plywood are used in conjunction with steam-hearted presses, and the time taken for curing depends upon the thickness of plywood. As an example, ¼-inch plywood glued which phenol resin requires twelve minutes under pressure of about two-hundred and fifty lbs. per square inch and a temperature of about one hundred and forty degrees Centigrade. It is interesting to note that if three boards of ¼-inch plywood are put between each pair of hot plates the time is twenty-five minutes. I would recommend that any factories contemplating the manufacture of high-grade plywood should be equipped to use resin adhesives.

The proposed Indian mission to the United Kingdom should include a chemist with experience in synthetic resins, so that all aspects of the gluing problem can be investigated.

When the matter of new factories, or expansion to existing factories, is under review, the question of location will need special study. If possible, there should be water for log transport and storage, adequate labour and facilities for dispatch to consuming centres.

There are two points of view. If high-grade plywoods are to be made, the availability of timber ~~must~~ will dictate the location. Alternatively, if the location is fixed by force of circumstances. the type of timber will dictate the

the type of factory and its equipment.

TYPE OF BUILDING:

The factories visited are divided into small sections, a most unhappy choice for plywood making. In the event of new factories being built - or extensions to the present - buildings - they should be single-storied and contain as few obstacles as possible.

The climatic conditions are such that for using resin adhesives a portion of the factory should be partitioned off and air-conditioned. This is the section in which the veneers are jointed and assembled ready for pressing.

MACHINERY AND EQUIPMENT:

A considerable amount of new plant is needed, which will involve reconstruction of steam and electrical services. Most of the machinery and equipment may be obtained in the United Kingdom, a point which is specially stressed in view of the currency restrictions. The only item which it may be advantageous to purchase from the U.S.A. is the lathe equipment, considerable advances have been made during the war in that country in the design and operation of veneer lathes.

Mention has already been made of the advantages of an adjacent sawmill, which could be completely equipped from the United Kingdom.

Generally speaking, the lathes in use in India are small, which is a contributory factor to high manufacturing costs. For the large logs available it is more economical to operates lathe capable of taking long lengths, thus avoiding the handling of a multitudinous number of pieces of veneer. When the logs have be cut ~~and put on to the smaller lathes for a further peeling~~ on th large lathes to the smallest practical diameter, they can be tak off, cross-cut and put on to the smaller lathes for a further peeling, so that one minimum size diameter core remains.

In the case of tea-chest plywood, the panels would be mad as far as possible in multiples and cut to final sizes after pressing. For this purpose a maximum lathe length of eighty inches to ninety inches would be adequate. (American nearest standard length is eighty-eight inches.)

For a general production and in a district where ax long loglengths are available, one lathe should be one hundred inches to one hundred and twenty inches long. In all cases the lathes should be provide for a forty-eight inch to fifty-four inch swin

The latest types of lathes operate at greater speed and with more accuracy than those seen in the majority of factories visited in India.

Production would be increased and the quality improved if the present hand-operated clippers were replaced by mechanical clippers for both wet and dry veneers.

There appears to be a general disregard to proper drying arrangements. The absence of control in this direction is demonstrated by the lack of moisture meters, by which continual checking of the condition of the veneers can take place during processing. For tea-packing in particular it is essential that veneers are properly dried before being made up, particularly if casein glue is used, in order to retard mould growth during the life of the teachests.

For large-scale controlled production a mechanical dryer is a necessity, the number and size of such dryers depending, of course, on output. They are generally built in three, four or five decks - the plate types are from eighteen feet to twenty-fi feet long and the continual run type for ordinary purposes up to forty-five feet long. Widths and heights are up to fifteen fee

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and ten feet respectively. Good headroom is required for installation, as in addition to the height of the machine casing, there is four a further four to five feet occupied by fans, motors and extraction ducts.

Thin plywood made with phenolic resin film glue or phenolic resin liquid glue requires reconditioning after pressing. This involves immersion in water to restore the moisture content taken out during the pressing. The soaked boards are then dried to the final moisture content by means of the same mechanical dryer

No jointing equipment had been installed in the factories visited, and in consequence plywood faces had to be in whole pieces with the crores made in components. It cannot be expected that the general run of logs will yield a sufficient quantity of wide widths to eliminate jointed faces, and in the interests of efficiency and economy jointing equipment should be installed.

When using components all veneers should be jointed for high-grade plywood, but in the case of commercial plywood the cores can be assembled without jointing.

There are various methods of ~~it~~ trimming the veneers preparatory to jointing and assembling, depending on whether they are to be edge-glued, taped or loose assembled. To prepare for edge-gluing, I would propose a travelling head-jointing machine; for taping or loose assembly, trimming may be carried out by guillotine or straight-line-edger.

Glue spreaders in the factories I visited appear to be working quite satisfactorily.

The majority of the presses I saw are cold and hand operated, although one factory, namely at Sitapore, has installed a small hydraulically operated hot press.

For the manufacture of tea-chest plywood, cold presses hydraulically operated, using casein glue, are cheap to work and satisfactory, provided the moisture content of veneers and plywood is properly controlled.

Any factories contemplating the manufacture of high-grade plywood must install a hot plate, hudraulically operated, multi-daylight press.

Press lengths should bear some relation to lathe lengths, so as to obtain, as far as possible, maximum utilisation of press area. Useful press sizes are one hundred inches by fifty inches, to work in conjunction with a one hundred and ten inch lathe, and seventy-four inches by fifty inches, to work in conjunction with an eighty-eight inch lathe.

short lengths arising from small peelers it is better to employ a small press such as fifty inches by fifty inches, as it is not satisfactory to use a large press continually for small sizes. It is usual to have from six to twelve daylights.

The plates are heated either by steam or by high-pressure hot water. (I am not making any special mention of High Frequency heating.) The required temperatures and pressures have already been mentioned under heading of adhesives.

After pressing, the panels must be dimensionised and cut square. For small capacity mills, a standard type saw-bench is quite adequate, but for a large mill I would recommend a straight line-edger or double-end cut-off saw.

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Although tea-chest plywood, which probably forms the bulk of the production, may not need sandling or scraping, triple-drum sanders should be installed for surfacing high-grade plywood. These are made in various widths, generally up to a maximum of seventy-two inches.

Some consideration has to be given to the question of mechanic conveyors for handling, but in all circumstances I would recommend that the high initial cost involved is unnecessary as there appears to be adequate labour available for the transportation of logs, veneers and plywood during all processes of manufacture. It is necessary to have well-designed trucks and stillages and, in the case of large factories, electrically-driven transporters and stackers.

In the following pages I have given a brief account of the conditions in the factories I visited and recommendations as to new plants which is required immediately.

Finally, as requested by Mr. H.M. Patel, I.C.S., Secretary, Industries and Civil Supplies Department, New Delhi, I make recommendations for equipment needed to lay out a new plywood factory.

Brief Account of Factories visited.

Plywood Products, Sitapore.

Production at present includes aircraft, marine and commercial quality plywood for the Government of India, Supply Department. Blockboards, decorative veneered panelling, plywood tubes etc. are also manufactured.

There is a lack of essential equipment, the provision of which would improve efficiency and increase the important contribution which the factory can make to Indian plywood requirements.

Special needs include mechanical dryer, jointing equipment, sanders and dimensionising saws. Power cranes are required in the log-yard and over the steaming pits. A mechanical cross-cut saw is wanted to handle the logs before steaming. The clippers in use are obsolete, and suggest that these should be replaced by mechanical types.

The production of this factory would be greatly improved with better quality of timber and more adequate stocks.

The building is divided up into too many small sections, a point which should be dealt with whenever extensions are carried out.

All their existing machinery, including their veneer cutters, is well maintained and functioning satisfactorily.

Mr. H. Thomson, the technical director, is extremely knowledgeable, and of the factories I visited this one is producing by far the best plywood.

Captain J Banerji, I.F.S., Director, Woodware Directora Department of Supply, accompanied me to this factory.

Mysore Plywood Corporation Limited, Yeswanthpur (Near Bangalore):

This factory is contained completely in new buildings erected by Mr. L.A. Gillinson, their managing partner. It is the best structure I have seen of the plywood factories visited in India, but It would be of advantage if one building had been erected instead of a number of small ones

I was informed by Mr. Gillinson that, due to circumstances,

he was unable to purchase plant made by specialists and, therefore, it was necessary that he had a large proportion of the machines built by his own people. The quality of the work being produced, considering the incomplete nature of the plant, is as good as can be expected.

Mr. Gillinson is anxious to increase his output, which at present is mainly tea-chests, furniture, electric light stands and bobbins, and would like a complete new plant, but I must suggest that the location of such a factory in relation to timber supplies needs careful consideration.

It should be recorded that his timber stocks were extreme-

Mr. G.B. Deshpande Assistant Director, Woodware Directorate, Department of Supply, accompanied me to this factory.

Western India Plywoods Limited,
Baliapatam (Near Cannanore):

I was glad of an opportunity of a discussion at this factory with Mr. A.K. Kader Kutty, managing director and Mr. Cook his plywood Engineer.

They have a large saw-mill, which is an advantageous adjunct to a plywood factory, the latter project being only recently started by Mr. Kutty, and in my opinion this factory is well sited, not only by reason of its proximity to the saw-mill, but also by the fact that it is near the forest area, from which suitable timber can be floated to the mill. I gather that Mr. Kutty controls his own timber resources and that he has facilities for hauling the timber out of the forests, which is a great advantage.

Mr. Kutty is prepared to spend further sums to make Western India Plywoods Limited into a first-class factory. New buildings are at present being erected and, in reply to a question about further land for extensions, I was informed that there would be no difficulty of any sort in that direction. Application has been made for the following new machines which I consider are necessary:--

From U.S.A.

Meritt one hundred and two inch C-143 clipper;
Merritt one hundred and two inch C-141 clipper;
Eighteen feet five-run dryer;
G.K. knife grinder, one hundred and eight inches:
Glue-mixer, seventy-five gallons;
Glue-spreader, sixty inches wide;
Hot press, one hundred inches by fifty-two inches, ten daylights.

From U.K.

Veneer slicer, to cutiten-feet flitches.

Some of the above machines, which it was intended should be ordered from the U.S.A., can be obtained equally well from the United kingdom.

I was informed that a new power house is being erected by the Madras Government and that sufficient power can be provide for the running of the extended plant in about six months time.

I was greatly impressed with Mr. Kutty's whole operation and I feel that he should receive every possible support from the Government.

Mr. G.B. Deshpande, Assistant Director, Woodware Directorate. Department of Supply accompanied me to this

p.t.o.

STANDARD FURNITURE COMPANY LIMITED, KALLAI:

The machinery, which is mostly of Japanese origin, is out of date and unsuitable. The buildings also are by no means properly designed or in a fit condition for the manufacture of good plywood.

I had the opportunity of a conversation with Mr. Rao Bahadur V. Krishna Menon, the managing director, who undoubtedly possesses a high degree of ingenuity and is practical, but he lacks the necessary facilities for good production.

It appears to me that the production should be up-graded, in view of the fact that he is supplying plywood for the Government of India and for the tea-trade.

There could be little improvement to the location of the factory, as it is conveniently situated for water transport from the forest and there is a sawmill adjacent, but I would recommend rebuilding the and new equipment.

I understand that Mr. Menon is putting up another factory at Chalakudy and he intends to duplicate his present plant. I cannot express my views about this new venture as I did not see it.

He has asked for the under-mentioned machines and, whilst I agree that he needs them, it would be very difficult for me to recommend that they should be installed in the present buildings, and he should be encouraged to rebuild completely. The machines required are:--

One splicer
One slicer;
One jointer;
One chain mortiser

Whilst in this district I had an opportunity of discussing the timber situation with Mr. Brown, Timber Supply Officer, and he confirmed my own impression that there would be little difficulty in obtaining adequate supplies in this area.

Mr. G.B. Deshpande, Assistant Director, Woodware Directorate, Department of Supply, accompanied me to this factory

Malabar Plywood Works, Feroke:

I gathered from my conversation with Mr. P.K. Nair, the managing partner, and with whom I was greatly impressed, that he is anxious to up-grade his plywood manufacture, and I feel that the Government should give him every possible support. Plywood manufacture is a new industry to Mr. Nair, but he has made considerable progress.

Whilst the plant is small, even though not modern, it is in good condition.

Furthermore, their proximity to a river renders this factory convenient for the handling of logs and is well located for timber supplies.

I was asked by Mr. Nair to make some suggestions as to the machinery required to bring his factory up to date, and I would recommend the following:--

Two jointers;
One splicer;
One dryer;
One hot press;
Two mechanical clippers;
One sanding machine;
One band saw, forty-eight-inch size, with an automatic carriage, twenty-five feet.
One planing and thicknessing machine, eighteen inches.

With this additional plant, the eventual manufacture should be entirely satisfactory and production greatly increased.

p.t.o.

Their current contracts are mostly for the Government of India, Supply Department.

Mr. G.B. Deshpande, Assistant Director, Woodware Directorate, Department of Supply, accompanied me to the factory.

BRIEF PROPOSALS FOR MEDIUM-SIZE PLYWOOD FACTORY FOR INDIA.

(Made at the request of Mr. H.M.Patel, I.C.S., Secretary, Industries and Civil Supplies Department):

These proposals are made at short notice, and no time was available for details being prepared by an engineering or architectural staff. They are subject to the many variable factors which are governed by local conditions and types of timber.

CAPACITY:

The scheme set out herein is based on an approximate output of ten million square feet of plywood per annum, on the basis of 3/16-inch thickness, equal to one hundred and fifty-six thousand cubic feet.

The desire was expressed that the plant should be capable of producing all grades of plywood, which would include tea-chest material and also plywood for constructional work.

Whilst this request has been followed, it should be pointed out that in the manufacture of tea-chest and similar material, a more economical operation is possible if the factory concentrates on one type of output.

If, due to any special circumstances, the commercial plywood and the highly specialised material must be made in the same plant, it would be desirable to allocate certain machines to one or the other type, or alternatively, certain hours or shifts.

In order to assess approximately the numerous variables, the example quoted has been based on a production of seventy per cent tea-chest and similar grades and thirty per cent high-grade plywood. In the absence of specific information respecting the logs to be used, an assumption has been made that the logs would give an overall yield of forty percent of plywood, and also that the plant would operate one shift per day, six days per week.

It has had to be assumed also that the district in which such a mill could be erected would be reasonably near to a source of timber of the different species and grades suitable for the proportions of tea-chest, utility and high-grade plywoods.

SPACE REQUIRED:

Covered floor space required would be approximately one hundred thousand square feet housing plant and despatch department, with additional area for the boiler-house.

Some outside space would be necessary for log storage, the size of this depending or the log stock which it is practical to maintain.

Under normal conditions a log space for a factory of this size would occupy some three to four hundred thousand

p.t.o.

square feet, but this depends entirely upon logging conditions and the methods adopted for handling. If water storage is available, this, of course, should be used.

The building should be on the ground floor only, with a minimum amount of stanchions, but it could be built of any available local building material.

For that portion of production required for high-grade plywood, fifteen thousand to twenty thousand square feet of the floor area would be required to be partitioned off and air-conditioned. This section would house the jointing plant and assembly tables.

In the United Kingdom a building of this description, including provision of all services, viz., heating, wiring for lighting and power, air-conditioning. lavatories, etc., would cost one hundred thousand to one hundred and ten thousand pounds sterling. (For the purpose of this report it has been assumed that electric power would be drawn from an existing source.)

LOG HANDLING:

There are alternative systems of handling logs in the storage yard. A gantry crane could be erected under which all log stocks are piled; thus, this, however, means a large initial outlay.

The alternative is a mobile crane of adequate lifting, capacity, and the logs can then be transported by trucks on light railway lines or by skids towed by a caterpillar tractor, horses or oxen, etc., depending on the conditions.

It has been found good practice to sort logs on arrival at the log-yard into lengths and grades. Although this requires more area, it has the advantage of rendering possible production planning on a scientific manner and for the logs to be drawn from the log-yard to suit the manufacturing programme.

Between the log-yard and the steaming vats, it is necessary to have a cross-cut or drag saw. This would be either an electrically or petrol driven chain or band saw. Its purpose is to remove defective ends and to cut logs into lengths required.

STEAMING VATS:

It is understood that certain species of Indian timber, particularly if fresh cut, need not be treated prior to cutting, but some of the woods will need hot-water treatment or steaming. There are no data available here as to the duration or temperatures required for Indian timbers, but I am suggesting that a vast capacity would be needed of up to ~~xx~~ ten thousand cubic feet. If, however, a large proportion of the timber available does not require this treatment, then the vat capacity would be correspondingly reduced in order to avoid an unnecessarily high initial outlay.

Some study would have to be made as to which would be the best system according to local conditions, that is to say, whether they would be hot-water vats below ground or saw-dust or steam vats above ground.

Whether these vats are above or below ground, it is necessary that they should have loose cover boards to facilitate the entry and exit of the logs. The entire vat system should be serviced by an electrically driven gantry crane. It is usual for logs to be taken in at one end and removed ~~xx~~ from the other to the cross-cut saw.

The logs can be conveyed from the cross-cut saw to the barking deck by a chain conveyor at ground level, but in order to keep this scheme as simple as possible, such a system is not taken into account. Methods of this sort depend upon labour conditions as prevailing.

The bark would be removed by large hand chisels, but again, if it is required to economise in handling, it can be accomplished by a special machine which has the further advantage of removing not only bark but the grit, thus prolonging the life of the knives in the veneer lathes.

VENEER CUTTING:

The barking deck should be conveniently situated behind the lathes, to which the logs are usually conveyed by overhead mono-rails with electrically operated tackle.

I would recommend that the smallest plywood unit be equipped with two lathes so as to accommodate the varying log lengths. Subject to special considerations of timber species available, one lathe should be one hundred and ten inches long by fifty-four inch swing with a steady rest and one lathe sixty-six inches long by fifty-four inch. This smaller lathe enables short lengths to be peeled to a small diameter; it also enables logs from the larger lathe, after being peeled to the minimum possible diameter on that lathe, to be cross-cut for further peeling to a smaller diameter on the small lathe

The steady rest is incorporated so that the spindles can be closed to a distance where shorter logs can also be cut.

The output of these two lathes for a mill working on one shift would be a little in excess of the basic quantity assumed. It is taken for granted that there will be very little demand for the thin veneer such as is used in aeroplane plywood.

HANDLING OF VENEERS FROM THE LATHES:

Generally speaking, there are two systems. One requires a long table leading away from the delivery side of the lathe, which is fitted with a conveyor. The veneer is peeled off on to the table, broken at suitable points, made up into packs and taken to the clipper at the end of the table by means of the conveyor.

The alternative system is to reel the veneer on to a bobbin as it leaves the lathe. The advantage of this system, which is beneficial only with high-grade logs; is that the veneers can be clipped to any dimension required with a minimum of waste. It is usually found that a combination of the two systems is better, the bobbin for the reeling being fixed on a gantly over the table containing the conveyor, so that one or the other can be operated according to circumstances

In recent years the reeling of the veneers from the lathe has been mechanised, the motive power being provided by an air motor which maintains a speed to synchronise with the speed of the lathe. If required, a conveyor can be placed below the ground at the delivery side of the lathes, on to which all waste would fall, and it is taken out of the factory by that means and eventually to the boiler house.

The mechanical reeling of the veneer and the conveyor system has been mentioned to give an indication of what would be included in a modern plywood mill, but it is not provided

in the main schedule of plant listed in this report.

WET CLIPPING:

The number of clippers needed depends upon the quality of the logs. The better the quality, the less clipping is necessary for the elimination of defects. I am, therefore, striking an average by suggesting three clippers.

There should be one to each lathe, one size one hundred and ten inches, one size sixty-six inches and a further size one hundred and ten inches as a spare clipper, which could service either of the lathes and remove bottle-necks in the event of an excess clipping arising at any time.

If the reeling system is installed, the reels are conveyed to the clippers by a mono-rail with electrically operated tackle.

It is modern practice to deal with waste from the clippers by an underground conveyor, similar to that provided for the lathes.

DRYERS:

The wet veneers after clipping should be mechanically dried in a tunnel conveyor type dryer, and for the production envisaged, working one shift, two such dryers would be necessary.

Alternatively, if three shifts can be worked, one dryer would be sufficient. There is an advantage in this system, as it enables all veneers cut on one shift to be dried without waiting until work starts the following day. This is particularly important in a hot climate, as veneers which are allowed to stand for an undue length of time in a wet condition in stacks, usually dry out on the ends and split.

The dryer can be either of the hot plate type, hot air with roller conveyor, or hot-air with chain mesh conveyor. If of the latter type it would need to be approximately forty-five feet long, thirteen feet wide and contain five decks.

JOINTING:

The amount required necessarily depends on the average width of the veneer being obtained, and for the purpose of this report an average width of sixteen inches has been assumed.

The high-grade plywood, amounting to thirty per cent of the out-put would need to have all veneers properly edge-jointed. The remaining seventy per cent of packaging and similar commercial plywood can have faces only jointed, the cores being assembled loose prior to pressing.

It is probable that large quantities of the packaging plywood can have the faces taped, which, for the purpose required need not be removed.

Taping is a cheaper operation than edge-jointing, and, therefore, to cover the jointing of faces and cores of high-grade plywood and faces only of the packaging and commercial grades, I am proposing four edge-jointers and two tapers.

Preparatory to either jointing, taping or loose assembly all veneers must be trimmed square and, if edge-jointed, must be glued.

To work in conjunction with the four edge-jointers, two travelling head-jointing machines should be installed and, in preparation for taping and for loose assembly, one guillotine, one straight-line-edger and one cross-cut saw.

p.t.o.

Plywood of one-eighth inch and thinner can be made efficiently and more easily by use of phenolic resin film glue, but for plywood over one-eighth inch a wet glue is normally used, and two glue spreaders are required.

PRESSING:

In order to provide for thirty per cent of the production as high-grade plywood, a heavy duty hot press is necessary having a working temperature of up to one hundred and fifty degrees Centigrade and capable of exerting a pressure over the entire platen area of up to three hundred pounds per square inch.

A convenient size for this proposed press would be one hundred inches by fifty inches, and to provide the output would need eight to ten daylights. The output calculation has been made on the assumption that in practice only two-thirds of the platen area would be effective.

For packing and similar plywood a cold press is far cheaper on operation, and a large output can be obtained provided sufficient floor space is available.

One cold press with "H" irons and cramps, size one hundred inches by fifty inches and with an opening sufficiently large to take a thirty-inch stack of plywood, would be more than adequate.

DIMENSIONISING:

The double-end cut-off saws would be required for dimensionising and trimming square.

Should a bottle-neck arise in this department, the straight-line-edger can be used which has been proposed for handling veneer trimming.

CONDITIONING:

After manufacture, hot press plywood of up to quarter-inch thickness would require dipping in water and passing through a mechanical dryer. Cold-press plywood, after coming out of the retaining cramps, must be thoroughly dried in a properly conditioned drying room. (This means a room in which the air circulates at a controlled temperature, which need be only moderate.)

SURFACING:

Two drum sanders, fifty inches, should be provided.

TABLES, TRUCKS AND STILLAGES:

Unless conveyors are provided to take away the waste from the barking deck, the lathes and the wet clippers, trucks will be necessary for this purpose.

During processing, subsequent to wet clipping, stillage and trucks are used, and two or three hundred would be needed.

In the detailed planning of a modern plywood factory, trucks are made to working height so that they can be used as transporters and also as working tables, thus avoiding the continual moving of veneer from the working tables to stillage

lathe knives and clipper knives, and one saw-sharpening machine.

It would also be necessary to instal general engineering maintenance plant.

STEAM RAISING:

Exclusive of factory heating, it is estimated that approximately six thousand lbs. of steam per hour would be required. It is of advantage to instal two boilers each one giving the required capacity; then during cleaning operations there will be no hold-up in the work due to lack steam. No information is available as to the type of fuel which would be consumed, and therefore it is not possible to give further details in regard to the boiler equipmen

With regard to heating, it can be stated that a factory of this size in the United Kingdom would require approximately five thousand lbs. of steam per hour.

SUMMARY OF PLANT SUGGESTED:

Log Yard:

Mobile crane with adequate lifting capacity (probably up to five tons).
Gantry with electrically operated tackle to service steaming vats.
One electrically or petrol-driven chain or band cross-cut saw.

Veneer Cutting:

One lathe, one hundred and ten inches by fifty-four inches, with steady rest,
One lathe, sixty-six inches by fifty-four inches.

Wet Clipping:

Two clippers, one-hundred and ten inches.
One clipper, sixty-six inches.

DRYING:

For one-shift operation, two tunnel type conveyor dryers, approximately forty-five feet long by thirteen feet wide, five decks.
(If operating this section with three shifts, one dryer would be sufficient.)

VENEER TRIMMING:

Two travelling head-jointers
One gullotine, one hundred and ten inches
One straight-line-edger
One cross-cut saw.

JOINTERS:

Four edge-glue-jointers.
Two tapers.

GLUING:

Two glue spreaders.

PRESSING:

One steam-heated hydraulically operated press, one hundred inches by fifty inches - eight to ten daylights.
One hydraulically operated cold press, one hundred inches by fifty inches - with opening to take three-foot stacks of veneers. Complete with "H" irons and retaining cramps.

p.t.o.

Trimming:

Two double-end cut-off saw:

Surfacing:

Two drum sanders, fifty inches wide.

Tricks and stillages:

Between two and three hundred required.

MAINTENANCE

One knife-grinder

One saw-sharpener.

ENGINEER'S EQUIPMENT AND SMALL TOOLS:

(The amount of this equipment depends upon local facilities. If a mill is erected in an isolated district, it is possible that the equipment will have to include a lathe, a milling machine and a drill.)

There has been insufficient time to obtain prices for all the items for this factory, and therefore, a very approximate present-day ~~xx~~ estimate only can be given in total for the above-mentioned machinery and equipment of fifty-four thousand pounds sterling, plus boiler plant of twelve to fifteen thousand pounds sterling.

This estimate excludes mechanical conveyors for logs and waste, but does include for mono-rails and tackles, together with tables and conveyors for servicing the wet clippers. There are several excellent manufacturers of plywood machinery in the United Kingdom.

ADDITIONAL OPERATIONS:

Modern plywood development has included the provision of super-size panels. These large sheets are obtained by scarf-jointing together plywood boards of standard size, and in many cases such panels are supplied to consumers shaped to templates and actually ready for use.

The equipment necessary would be two scarf-cutting machines and one steam-heated hydraulically operated scarf-press, size ten feet by nine inches, and having six daylights.

For sanding the scarf points, two belt sanders should be provided.

For shaping plywood panels I would recommend one band saw and one router and a small general saw bench.

I estimate that this further equipment would amount to approximately four thousand pounds sterling.

To draw up a complete scheme, accurate in every detail, would require first of all careful study of the locality in which the factory is to be situated investigation into the character of the timbers to be cut, and detailed planning by consulting engineers and architects.

We may obtain a copy of the All India Report on the Plywood Industry.

A.S.

A draft letter is put up below for approval.

(Issued as Letter No.1558 P & D-IV/47-5, d/2-4-47)

Issued as Letter No.1558 P & D-IV/47-6, d/28-4-47
d/28-5-47
From the Government of India, Department of Industry and Supply No.IP-35(7)/47, dated 19-6-47
Issued as Letter No.1558 P & D-IV/47-8, d/2-8-47
From the Government of India, Ministry of Industry and Supply, No.IP/1\2)-35(7)/47, dated 8-11-47.

A.S.

Submitted for perusal of the letter at p.67 c.f. The report is kept below. Pp.7-9 of the Report consists of remarks relating to the three plywood factories inspected by the author in this Province. There is no information available as to the action taken by the Government of India so far in improving the industry. The author's proposal for a medium sized plywood factory for India will be found at pp.10-15 of the Report.

For orders as to what further action is to be taken.

No action

** ** - J.S.
21-4-47

Development Department.
(P & D)

A.S.

The file may be recorded.

G.O.Ms.No.5507, Development,

dated 29-11-1947.

Industries - Plywood industry - Papers - Recorded.

(True copy)

S. Jayanandan 12/5/54

Office Assistant,
Madras Record Office

aj/12.1

11/5/54